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ABSTRACT

Teaching methods seem to work with some students and fail with others, because every learner is unique. Teachers must be able to identify learning styles and find ways for instruction to match those styles. This paper moves from an overview of different learning styles to a review of the use of computer-assisted instruction. A recent development in technology, known as hypermedia, is described as a tool for faculty training and managing curricula. Hypermedia is an expansion of the hypertext concept that allows for the inclusion of media links as well as data links. Information in various types of electronic media can be accessed by activating the link. The user can explore information in a direction and speed suited to his or her learning style, as well as through the sensory stimuli that best enhances learning. The HyperCard software package provides tools to permit the educator-author the freedom and flexibility to address the needs of any learner. While development efforts may require more time when using technology to provide alternative learning paths, only minor revisions should be needed once the original work is done. (Contains 10 references.) (SLD)

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ACCOMMODATING LEARNING STYLES THROUGH HYPERMEDIA

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Introduction

As teacher educators, we continually seek ways to help the educators and trainers that we work with to become more effective teachers. We believe that integrating the use of technology with the identification of individual learning styles is a realistic approach to help us accomplish this task. Our profession has not been very successful in identifying specific attributes, such as personality, teaching styles, new technology, or unique curriculum approaches that have resulted in improved student learning. The approaches we use seem to work with some students and to fail with others. Why? We believe it is because every learner is unique and that we must learn to identify their individual learning styles and, once identified, find ways to match our instruction to their predominant learning styles.

Overview Of Learning Styles Theory

In spite of our best efforts to force students to learn in ways that we design and provide, they seem to insist on learning in their own way. In fact, it appears from the research literature that each learner has a preferred method of processing information. This preference is often referred to as the individual's "learning style." Sperry (1972) suggests that learning style differences are based upon variations of cognitive structure. One's learning style is an outgrowth of how one thinks, solves problems, and perceives the stimuli. The individual's personal method or style of learning is a key element in the educational process. If we insist on ignoring this important aspect of learning, then we can not expect to succeed.

The integration of learning style research into the educational process coincides with the Gestalt orientation to education. The Gestalt position stresses the individual's perception of informational ambiguity as the catalyst for learning. Once an individual is introduced to a situation that is perceived as ambiguous, that person seeks to reduce the ambiguity. Learning occurs when a new situation is presented and an individual is called upon to resolve the inherent ambiguity. The resultant learning is meaningful and effective because it is intrinsically rewarding to accomplish.

The implications of a Gestalt approach to education are significant. According to Gestalt doctrine, excessive ambiguity will impair learning (Pittenger and Gooding, 1971). This means that the teaching strategies we select must present intellectual challenges to the learner without causing frustration. Since our learners are all different, we must accept the fact that this means we must provide a variety of teaching methods to better match the variety of learning styles our students bring to the classroom setting. Inadvertently providing excessive ambiguity by creating curriculum that does not address differences in learning style will certainly impair learning and may even be destructive. Certainly, Gestalt theory demands consideration of the learner's style in order to find the balance necessary to accomplish the basic goals of education. However, the results of educational research frequently end up indicating "no significant differences." We may conclude that this failure to find significant differences occurs so frequently because the experimental approach works well but only with a certain group of the students while the traditional approach works well with a different group of the learners. One method, no matter how good it is, just doesn't work for all learners.

What is needed is a three-fold effort. First, we have to develop training programs that will enable faculty to recognize that there are differences in the way that different learners approach the same learning tasks. Second, we must be able to show faculty how to use instruments to identify various learning styles. Finally, we must offer faculty help in designing variable approaches to learning and in assigning them to students in a way that faculty can manage.

Background

In the remainder of this paper, we will move from a brief overview of the different approaches to learning styles to a short background on the use of computer assisted instruction. We will conclude the paper with an overview of the use of a recent development in technology, known as "hypermedia," to our task of developing faculty training and to providing them with a tool to ease the task of managing curriculum that takes the variety of learning styles into consideration.

Learning Styles

There are a variety of approaches to the identification of learning styles. Some concentrate on a single, major dimension such as Witkin's use of the embedded figures test to classify learners as field dependent (global) or field independent (analytical). Others seek to go beyond the cognitive dimension and they try to develop a total profile. This multi-dimensional approach is used in cognitive mapping at Oakland Community College and in the 21-dimensions identified by Rita and Kenneth Dunn in their Learning Styles Inventory

(Slater, 1989). Others seek to use a "fun-filled" approach to learning styles theory to better help train teachers in a manner that they will both understand and remember. One example of this lighter approach is the use of "True Colors," developed from the Myers-Briggs approach by Don Lowry (1985). However the learning styles analysis is approached, the goals are the same: to identify ways in which different students learn. Once identified, different instructional methods can be developed to help different types of learners succeed.

In planning training sessions, we must allow ample time for the teachers to explore tools for the identification of student learning styles. Then we can concentrate on helping faculty enlarge their teaching repertoires so they are better equipped to match the various teaching strategies they can use with their students' learning styles (Dunn, 1979).

An Overview Of Traditional Computer Assisted Instruction

As we look at the development of CAI, we can see that technology has provided us with a new tool to help match instruction to individual learning styles. The magnitude of the management of such varied instructional efforts would be staggering if we had to do the work by hand. However, with the use of technology, we now have the means to provide different learners with different learning methods. This means that the matching of curriculum and learning styles is now a real possibility. Earlier efforts were made to use technology, in the form of teaching machines, for this purpose in the 1960's. To better understand these early efforts to use electronic tools to help improve instruction, we'll briefly review their development.

Programmed Instruction

The application of B.F. Skinner's theories of operant conditioning to education resulted in a learning theory that stressed the importance of continual and immediate reinforcement. While reinforcement is not new as motivation for learning, Skinner brought to the field of learning theory, not just an emphasis on reinforcement but a suggestion for systematic implementation. Building on the work of S. J. Pressey, the first psychologist to create a mechanical teaching tool, instruction was designed to allow the learner to become active in the learning process rather than being a passive receptacle (Skinner, 1964). Reinforcement was provided to each learner individually and immediately. The machines were designed so that the learner moved through a sequence of learning steps at his or her own pace (individualized instruction). In addition, the learner was reinforced with a positive comment and with mastery of the information as the material was presented.

Early teaching machines were clumsy both physically and in their presentation. It was not until the advent of microcomputer technology in 1977 that the potential of the teaching machine concept could be realized. The use of computers as teaching machines demonstrated that it was possible to effectively apply Skinner's principals and the resultant theories to individualized instruction. These theories, in turn, became the basis for computer assisted instruction (CAI).

CAI can be defined as "an instructional technique in which the computer is used to (a) control presentation of stimuli to a student, (b) accept and evaluate the student responses, and (c) based on that interaction, to present further stimuli calculated to shape the student responses in the desired manner" (AECT Task Force, 1977, p. 324).

Brown suggests that CAI can improve meta-cognition skills. That is, CAI can facilitate the skill needed for thinking about thinking, learning, remembering and diagnosing. CAI is a learning-by-doing environment. Such an environment provides students with an opportunity to learn about themselves and their thinking and learning styles. By interacting with a computer supporting many of the CAI techniques, the learner is one-on-one with a machine that is essentially reflecting his or her own learning. This reflection gives the learner the opportunity to relate to his or her own learning and, thus, may make the individual more aware of himself or herself. This represents the achievement of meta-cognition through CAI.

A new phase in the evolution of CAI is centered around hypermedia: the advent of a new approach to the storage, retrieval and use of information in a non-sequential manner. The application of this new tool to education provides a startling new approach to CAI.

Hypermedia and CAI

During the late 1960s, Theodore Nelson coined the word "hypertext" to describe the body of non-sequential writing that allowed authors to link information to create paths of data discovery (Meyrowitz, 1989). In hypertext, information was not structured into a linear presentation but was instead presented as optional paths to follow as the data was explored by the user. Informational links allowed the reader to move either in a linear fashion or in a "non-logical" manner as they intuitively desired. The creation of these links from one bit of information to another was the hypertext author's contribution to the flow of information. The direction of the flow was determined by the user.

Hypermedia is an expansion of the hypertext concept that allows for the inclusion of media links as well as data links. Information stored in various types of electronic media (computer text, graphics, video, sound, and animation) can be accessed by activating the link. The user can, thus, not only explore the information in a direction and speed suitable to his or her own learning style but also by using the sensory stimuli that best enhances learning.

The Apple Macintosh product, "HyperCard," was the first of the hypermedia products widely available. Recently, the hypermedia product, "LinkWay", has become available for MS-DOS machines. HyperCard is not a traditional software application. It is a software engine, a powerful tool box to create and drive hypermedia presentations (Goodman, 1987). Hypercard allows the user to create stacks of information linked together on pivotal common data. It provides a platform where users can explore information by selecting their own pathway through those links.

It is this linked structure that lends itself so effectively to the development of computer aided instruction that can successfully accommodate learning styles. It provides for a CAI format that allows for the flexibility necessary to adjust to individual differences in learning. Typically, authors of CAI software determine the direction and flow of the user's interaction with the data. With a hypermedia-based CAI package, users can progress and experience as their own personal learning styles dictate. If a text-based, linear progression is best for a learner, that learner can select a path through the links that emphasizes text-based presentations. Learners with a broader, less structured learning style may explore the data in a tangential manner, leaping from one path to another while synthesizing the concepts presented. Learners who require multi-media input, such as sound

and graphics as well as text, can be accommodated with a link to information stored in that format. HyperCard provides tools to allow the educator-author the freedom and flexibility to address any learner's needs.

To really see how hypermedia can be a useful curriculum development tool, the reader needs to attend a demonstration of hypermedia. At the demonstration, pay special attention to the way the instructional developer can provide alternative paths (or learning strategies) for students to select. During the demonstration, think about the many opportunities that hypermedia open up for teacher-educators to match learning styles and teaching methods.

It is true that development efforts require more time when using technology to provide alternative learning paths. Learning styles must be determined and alternative teaching strategies must be designed. Opportunities for choices of strategies that accommodate a variety of learning styles must be provided. However, once the initial development work is done, only minor revisions should be needed.

Reminiscent of the "one-room schoolhouse," our teachers of tomorrow will be equipped, through the use of the electronic tools provided by hypermedia, to provide for the individual learning needs of each student. We, as teacher educators, must become ready to plan the training needed so we can begin the development of student-responsive curriculum today.

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